CLAIMS

1. A steel for structural parts of automobiles having excellent formability, fatigue endurance after quenching, low temperature toughness, and resistance for hydrogen embrittlement, wherein the steel has a composition containing, by mass, the following:

C: 0.18 to 0.29%

Si: 0.06 to 0.45%

Mn: 0.91 to 1.85%

P: 0.019% or less

S: 0.0029% or less

Sol. Al: 0.015 to 0.075%

N: 0.0049% or less

O: 0.0049% or less

B: 0.0001 to 0.0029%

Nb: 0.001 to 0.019%

Ti: 0.001 to 0.029%

Cr: 0.001 to 0.195%

Mo: 0.001 to 0.195%

so that the carbon equivalent Ceq defined by the equation (1) below satisfies a value of 0.4 to less than 0.58, and the total x of multiplying factors including that for B according to Grossmann satisfies a value of 1.2 to less than 1.7, the balance being substantially composed of Fe, and the steel also has a structure in which the ferrite grain diameter df corresponding to a circle is 1.1 μm to less than 12 μm, and the ferrite volume fraction Vf is 30% to less than 98%:

$$Ceq = C + Mn/6 + Si/24 + Ni/40 + Cr/5 + Mo/4 + V/14 \quad (1)$$

wherein C, Mn, Si, Ni, Cr, Mo, and V represent the contents (% by mass) of the respective elements.

2. The steel for structural parts of automobiles according to claim 1, further comprising, by mass, at least one selected from 0.001% to 0.175% of Cu, 0.001% to 0.145% of Ni, and 0.001% to 0.029% of V in addition to the above composition.

3. The steel for structural parts of automobiles according to claim 1 or 2, further comprising 0.0001% to 0.0029% by mass of Ca in addition to the above composition.

4. A method for producing a steel for structural parts of automobiles having excellent formability, fatigue endurance after quenching, low temperature toughness, and resistance for hydrogen embrittlement, the method comprising heating a steel slab at 1160°C to 1320°C, hot-finish-rolling the steel slab at a finisher delivery temperature of 750°C to 980°C, and then coiling the hot-rolled steel at a coiling temperature of 560°C to 740°C after slow cooling for a time of 2 seconds or more to produce a hot-rolled steel strip, wherein the steel slab has a composition containing, by mass, the following:

C: 0.18 to 0.29%

Si: 0.06 to 0.45%

Mn: 0.91 to 1.85%

P: 0.019% or less

S: 0.0029% or less

Sol. Al: 0.015 to 0.075%

N: 0.0049% or less

O: 0.0049% or less

B: 0.0001 to 0.0029%

Nb: 0.001 to 0.019%

Ti: 0.001 to 0.029%

Cr: 0.001 to 0.195%

Mo: 0.001 to 0.195%

or further containing at least one selected from 0.001% to 0.175% of Cu, 0.001% to 0.145% of Ni, and 0.001% to 0.029% of V, and/or 0.0001% to 0.0029% of Ca so that the carbon equivalent Ceq defined by the equation (1) below satisfies a value of 0.4 to less than 0.58, and the total x of multiplying factors including that for B according to Grossmann satisfies a value of 1.2 to less than 1.7:

$$Ceq = C + Mn/6 + Si/24 + Ni/40 + Cr/5 + Mo/4 + V/14 \qquad (1)$$

wherein C, Mn, Si, Ni, Cr, Mo, and V represent the contents (% by mass) of the respective elements.

5. A method for producing a steel tube for structural parts of automobiles having excellent formability, fatigue endurance after quenching, low temperature toughness, and resistance for hydrogen embrittlement, the method comprising making a tube from the hot-rolled steel strip by electric resistance welded tube making with a width reduction of hoop of 8% or less, the hot-rolled steel strip being produced by the method according to claim 4 and used as a raw material immediately after hot rolling or after pickling of the hot-rolled steel strip.